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1: J Chromatogr B Biomed Sci Appl 2001 May 25;756(1-2):307-13

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Molecular basis of allergic cross-reactivity between group 1 major allergens from birch and apple.

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Patients allergic to birch pollen often also react with fruits and vegetables, such as apple. The major cause of cross-reactivity between birch and apple is biochemical and immunological similarity between the major allergens, Bet v 1 and Mal d 1, as demonstrated by serological and cellular immunoassays. In addition, birch pollen-specific therapeutic allergy vaccination has been shown to improve allergic symptoms caused by oral ingestion of apple. Detailed analysis of molecular surface areas based on the crystal structure of Bet v 1, and primary sequence alignment, identify potential epitopes for cross-reactive antibodies. Two or more conserved patches are identified when comparing Bet v 1 and Mal d 1, thus providing a molecular model for serological cross-reactivity involving more than one IgE-binding epitope. A minimum of two epitopes would be necessary for cross-linking of receptor bound IgE in functional histamine release assays and skin test. Individual amino acid substitutions, as occurring in isoallergenic variation, may, however, have a dramatic effect on epitope integrity if critical residues are affected. Thus, one area large enough to accommodate antibody-binding epitopes shared by all known Mal d 1 isoallergens and variants is identified, as well as areas shared by Bet v 1 and individual Mal d 1 isoallergens or variants. The occurrence of limited epitope coincidence between Bet v 1 and Mal d 1 is in agreement with the observation that some, but not all, birch pollen allergic patients react with apple, and that the epitope repertoire recognised by the IgE of the individual patients determines the degree of cross-reactivity.

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